

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
PRIMARY OXYGEN PRESSURE SENSOR, ITEM 112 ----- SV778528-1/-2 (1)	2/2	112FM01  Erroneous output voltage (drifts low).  Pressure increase in the sensor reference cavity due to leakage through the case or Bourdon tube; failure of the potentiometer linkage due to increased friction; mechanical shock loading of the linkage which causes a misalignment of the resistive element relative to the wiper.	END ITEM: False indication of low oxygen tank pressure.  GFE INTERFACE: Erroneous CWS warning of high oxygen use rate from primary oxygen tanks.  MISSION: Termination of EVA. Loss of use of one EMU.  CREW/VEHICLE: None.  TIME TO EFFECT /ACTIONS: Seconds. If EVA, return to the vehicle when the CWS projects that there is less than 30 minutes EVA time remaining or when the pressure reading drops below 150 psia. If detected during EMU checkout sequence, do not use EMU.  TIME AVAILABLE: N/A  TIME REQUIRED: N/A  REDUNDANCY	A. Design - -1 Conrac and -2 Gulton: Conrac Design: The .010 inch thick seamless Inconel X750 Bourdon Tube is solution heat treated to a yield strength of 100,000 psi after forming to provide a high strength, corrosion resistant pressure barrier that has been burst tested to 5000 psi before leaking. The sensing element and surrounding outer case are all metal/glass, welded/brazed construction and are Helium leak checked to ensure a hermetic seal. All linkage and resistive element attaching screws are potted in place to prevent shifting. Gulton Design: The Bourdon Tube is .008 inch thick seamless Inconel 718 which is solution heat treated to give a yield strength of 175,000 psi after forming. The sensing element and surrounding outer case are all-metal/glass welded/brazed construction and are Helium leak checked to insure a hermetic seal. All linkage/resistive element attaching screws are potted in place to prevent shifting. The sensing element is pressure cycled to proof pressure for 250 cycles at 250 degrees F and the wiper/coil mechanism is wear-in cycled for 100 cycles.  B. Test - Component Acceptance Test - The sensor is subjected to random vibration (6.1 g rms) testing to ensure there are no workmanship or material problems that would cause the voltage to shift lower. The sensor assembly is vacuum outgassed and temperature cycled then subjected to calibration test at high and low temperature (30 to 120 deg F) to ensure there are no defects that thermal expansion/contraction would uncover and ensure sensor is stable.  PDA Test - The sensor is calibration checked as assembled on the shear plate to insure the output voltage is within spec limits.  Certification Test - Certified for a useful life of 25 years (Ref. EMUM-1434).  C. Inspection - The sensor is visually inspected for workmanship and completion to the drawings prior to case assembly. All sensors are calibration checked during steps in the assembly process to ensure the sensor output is within specified limits. The Gulton sensor is pressure cycled for at least 350 cycles during assembly to ensure the sensor is stabilized. The Gulton sensor is temperature cycled to ensure it is stable.  D. Failure History - B-EMU-122-F001 (12/23/99) - During STS-103 EVA #2, EV4 reported a "CO2 High" message on the DCM. Telemetry read 29.95 MMHG, corresponding to an off-scale high reading of the transducer. EV4 mission specialist reported no high CO2 symptoms. IRCO2 sensor latched due to excess moisture in the sense cell caused by excess moisture in the vent loop. Immediate corrective action not required, as similar flight anomalies are easily identifiable as sensor failures and not CO2 build up. Potential corrective actions to be evaluated.

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		112FM01	SCREENS: A-N/A B-N/A C-N/A	E. Ground Turnaround - Tested for non-EET processing per FEMU-R-001, Transducer and DCM Gage Calibration Check. FEMU-R-001 Para 8.2 EMU Preflight KSC Checkout for EET processing.  F. Operational Use - Operation Effects - Crew Response - PreEVA: Use airlock panel 02 gauge to approximate Primary 02 Tank pressure, continue with EVA prep. EVA: When CWS data confirms low primary tank pressure, terminate EVA. Consider 02 recharge to recover EMU operation. If failure can be determined to be sensor, continue EVA. Training - Standard EMU training covers this mode. Operational Considerations - Flight rules require EVA termination when minimum primary consumables remain. EVA checklist procedures verify hardware integrity and operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.

EXTRAVEHICULAR MOBILITY UNIT  
SYSTEMS SAFETY REVIEW PANEL REVIEW  
FOR THE  
I-112 PRIMARY OXYGEN PRESSURE SENSOR  
CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

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